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# Research as an Everyday Aid in Manufacturing

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*Necessity for Industrial Research.* In an industrial plant the emphasis placed on production is of the utmost importance. In comparison that given to research is negligible. It too often is omitted entirely, with the result that industrial research receives neither the support nor the consideration which its importance demands.

Every industrial plant, without respect to its output, needs a department of research as an insurance for continuity of production. This department is invaluable as an adjunct of the other essential phases of manufacture. Thorough investigation of any problem affecting the perfectness of a product ultimately gives results in changes, adaptations, and improvements. These form the link between new discoveries, patents, and processes. They are not always the result of a study of the routine output, but frequently are the outgrowth of related investigations suggested by changes in the market for the production, new discoveries in other establishments, and suggestions from the fertile minds of scientists in government bureaus and educational institutions.

*Organization of Department.* The organization of the department must be carefully coördinated between the administrative, executive, and the other departments of production. Its personnel must be chosen with reference to the problems to be attacked; a few resourceful, capable men rather than a number of individuals. Its chief should have direct access to the highest official, and its function should always be advisory and never executive in its operations. This department should be one of reference, study, experiment, statistical and bibliographical; the place where questions are asked, where problems are submitted, and where troubles are discussed. It ought to be the telescope that brings into sight that which is necessary for the organization to see before it arrives, thus forming one of the most important factors in the progress of production.

*Value of Research.* We can scarcely overestimate the value of

industrial research, because it forms the link between mass operations and individual initiative. A single contribution from one employe may radically affect the failure or success of a process vital to production. As a department, through its staff it maintains a perspective of each day's procedure, of each day's operations, and discloses that which may not be apparent to those who are participating as a group in the day's production. It can take time and nurse a suggestion, test it, experiment with it, study its relation to the problems of the day, and finally reduce it into an acceptable operative means for increasing efficiency.

*Production and the War.* A manufacturing plant is not unlike any other group enterprise, the extreme illustration of which confronted us in the national crisis in the recent war. The government was compelled to increase greatly its production in certain fields. Materials, processes, labor, capital, all had to be harnessed for team play. Manufacturing methods had to be quickly changed, amplified, and all the forces available were compelled to recognize that the unit of *time* was the prerequisite and most important item. To accomplish results it was necessary to overcome retardation due to tradition, established methods of equipment and organization. Available knowledge, long in our possession, but never used, had to be called into service. Short cuts to results, utilizing new and old appliances in a more effective manner, became the paramount consideration, even more important than the usual test of manufacturing enterprises, manufacturing costs.

*By-Products.* Raw materials had to be used more efficiently. The by-products of some of these materials became even more important than their peace-time uses. Space saving was a factor equal to storage, transportation, and other similar facilities. Mechanical equipment for handling supplies became increasingly important, as large numbers of men were drawn into the military service. The technically trained expert became doubly useful as he applied and used knowledge which had been lying quiescent.

*Effect on Field Operations.* No concept of those who were at the front could be executed with precision, accuracy and speed unless those far removed from the scenes of action could pour in a limitless flood of what we could produce at home. Industrial research applicable to great issues became immediately apparent.

It is unthinkable that what it has done for the nation shall be forgotten or that it shall not in a similar way become an integral part of a well organized industrial plant.

*Facilities for Department.* Industrial research, if thoroughly conducted by a suitable staff with facilities for experiment, usually brings a fresh mind upon an old problem and outside perspective on an inside process, a mass of knowledge collected outside the works placed at the disposal of those who can use it. It catches and holds half-formed aspirations for an improved product and points the way to new ventures. Industrial research provides the lens through which the vision may be focused on important phases of manufacture which otherwise would be only half-thought dreams that would never materialize into realities.

*Specifications for Materials.* Industrial research always justifies its existence and brings dividends when it attacks the composition, the use and the adaptation of materials. It eliminates waste. It provides substitutes better and less costly. Research in materials finds a use for scraps, and discarded parts. It may even discover by-products which will largely defray the cost of the original purchases. It standardizes raw materials and supplies by its investigation so that labor costs will not be added to something which must be eliminated.

*New Processes.* Industrial research recognizes the necessity for testing and experimenting with new processes, and in the study and investigation of these processes supplies the statistical information as well as the method of control, planning the routing and transportation of the finished product.

*Effect on Market for Product.* If its activities are directed outside the factory, it frequently discloses new markets which cannot be apparent in the ordinary sales organization. It provides the information on processes of manufacture which is sometimes the most effective publicity and advertising material.

*Complete Service.* No modern manufacturing plant can be fully organized unless it has a department whose functions are to penetrate new fields, correct defects, standardize processes, specify qualities and quantities of materials, study the routing and flow of the product from the entrance of the raw materials to the shipping or delivery point without lost motion or undue and unnecessary retracing of the distance to be traversed.

This department must be sensitive to the changing demands of the user, reduce bulk, increase safety in transit, devise quick and effective methods of inspection, be responsive to suggestions for improvement, investigate and tabulate statistics and interpret them for other departments. It must keep in close touch with the changes introduced by competitive producers, and study with intelligence the trade journals of this country and Europe with a view to adapting and utilizing new inventions, processes, and methods wherever they are applicable to the conditions of production.

*Personnel and Labor.* The employes of a modern manufacturing plant respond with avidity to every movement, every scientific development which enhances and increases production, if they can be instructed as to its relationship to their own individual contribution. One of the most notable expressions of this kind is the recent resolution of the American Federation of Labor on Scientific Research, which is herewith reprinted in full:

WHEREAS, scientific research and the technical application of results of research form a fundamental basis upon which the development of our industries, manufacturing, agriculture, mining, and others must rest; and

WHEREAS, the productivity of industry is greatly increased by the technical application of the results of scientific research in physics, chemistry, biology and geology, in engineering and agriculture, and in the related sciences; and the health and well-being not only of the workers but of the whole population as well, are dependent upon advances in medicine and sanitation; so that the value of scientific advancement to the welfare of the nation is many times greater than the cost of the necessary research; and

WHEREAS, the increased productivity of industry resulting from scientific research is a most potent factor in the ever-increasing struggle of the workers to raise their standards of living, and the importance of this factor must steadily increase since there is a limit beyond which the average standard of living of the whole population cannot progress by the usual methods of readjustment, which limit can only be raised by research and the utilization of the results of research in industry; and

WHEREAS, there are numerous important and pressing problems of administration and regulation now faced by federal, state and local governments, the wise solution of which depends upon scientific and technical research; and

WHEREAS, the war has brought home to all the nations engaged in it the overwhelming importance of science and technology to national welfare; whether in war or in peace, and not only is private initiative attempting to organize far-reaching research in these fields on a national scale, but in several countries governmental participation and support of such undertakings are already active; therefore be it

RESOLVED, by the American Federation of Labor in convention assembled, that a broad program of scientific and technical research is of major importance to the national welfare and should be fostered in every way by the federal government, and that the activities of the government itself in such research should be adequately and generously supported in order that the work may be greatly strengthened and extended; and the Secretary of the Federation is instructed to transmit copies of this resolution to the President of the United States, to the president pro tempore of the Senate, and to the speaker of the House of Representatives.

*National Interest in Industrial Research.* Simultaneously with this expression of organized labor, the national government has greatly enlarged the fund for investigation and research work in the field of modern industry. This has been brought about by the intelligent and persistent efforts of the National Research Council, who have perpetuated the splendid beginning made by them during the war by carrying on their activities for the benefit of industry during the period of reconstruction.

The results of the National Research Council have been amplified by contributions made in similar fields by the Rockefeller Foundation in the field of chemistry and physics, and by liberal support from the Carnegie Corporation, which has taken a keen and timely interest in this important subject, by the Society of Mechanical Engineers through its research fund contributed by Mr. Ambrose L. Swasey of Cleveland, Ohio. With all of these agencies for the development of industrial research, in coöperation with the many similar operations in the same field fathered by universities and institutions of technology of the highest rank all over the United States, the modern manufacturing enterprise would be derelict in its duty to the economic well-being of the nation if it did not fully avail itself of all of these activities by making suitable provision for departments of industrial research in every individual manufacturing establishment.